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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,722	10/27/2003	Hiroshi Morioka	032045	9699

38834 7590 01/26/2007

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EXAMINER	
CHACKO DAVIS, DABORAH	
ART UNIT	**PAPER NUMBER**
1756	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/692,722	MORIOKA, HIROSHI	
	Examiner	Art Unit	
	Daborah Chacko-Davis	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-12,14-17,19 and 21-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-12,14-17,19 and 21-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 27-28, are rejected under 35 U.S.C. 102(e) as being anticipated by U. S. Patent No. 6,579,808 (Cho et al., hereinafter referred to as Cho).

Cho, in the abstract, in col 3, lines 18-67, in col 4, lines 1-60, discloses a patterning forming method of forming a gate layer on the substrate, followed by an insulating layer, forming an organic antireflection layer on the insulating layer, forming a photoresist layer on the antireflecting layer, performing an exposure and development process on the photoresist layer to form a photoresist pattern (substrate at about room temperature), dry etching the sidewalls and top portions of the photoresist pattern using SO_2 , and He as the etch gas mixture; etching the antireflecting layer using the resist pattern as the mask, etching the insulating film (first film) using the patterned antireflecting layer as the mask, removing the resist pattern and the patterned anti-reflecting layer, forming the gate structure underlying the insulating film pattern (claims 27, and 28).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-2, 4-6, 9-12, 14, 17, 19, 21-22, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,579,808 (Cho et al., hereinafter referred to as Cho) in view of U. S. Patent No. 6,110,826 (Lou et al., hereinafter referred to as Lou).

Cho, in the abstract, in col 3, lines 18-67, in col 4, lines 1-60, discloses a patterning forming method of forming a gate layer on the substrate, followed by an insulating layer, forming an organic antireflection layer on the insulating layer, forming a photoresist layer on the antireflecting layer, performing an exposure and development process on the photoresist layer to form a photoresist pattern (substrate at about room temperature), dry etching the sidewalls and top portions of the photoresist pattern using SO_2 , and He as the etch gas mixture; etching the antireflecting layer using the resist pattern as the mask, etching the insulating film (first film) using the patterned antireflecting layer as the mask, removing the resist pattern and the patterned anti-reflecting layer, forming the gate structure underlying the insulating film pattern (claims 1, 4-5, 9-11, 14, 17, and 19). Cho, in col 3, lines 28-31, discloses that the etch process further includes implanting ion to form source and drain regions, and a gate (claim 21). Cho, in col 4, lines 14-17, discloses that the over etch (additional etch) performed on the

antireflecting coating and photoresist film results in a reduced dimension of the same (claim 22).

The difference between the claims and Cho is that Cho does not disclose that the flow rate of the first gas is equal to or greater than 40% of a flow rate of the mixture gas. Cho does not disclose that the mixture of etch gases includes oxygen (claims 2, 6, 12).

Lou, in col 6, lines 1-15, discloses that the mixture of gases includes oxygen, and that the flow rate of the first gas i.e., helium (He) is at least greater than 40% of flow rate of the mixture of gases.

Therefore, it would be obvious to a skilled artisan to modify Cho by including oxygen in the mixture of etch gases, and by utilizing the gas flow rates suggested by Lou because Lou, in col 6, lines 1-15, discloses that after the image formation of the line trench in the photoresist layer, a plasma etch is performed on the exposed photoresist using etch gases such as O_2, SO_2, and He in the claimed flow rate, so as to continue the etch process until the etch stop layer is reached while forming a line trench pattern in the underlayer.

5. Claims 7-8, and 15-16, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,579,808 (Cho et al., hereinafter referred to as Cho) in view of U. S. Patent No. 6,110,826 (Lou et al., hereinafter referred to as Lou) as applied to claims 1-2, 4-6, 9-12, 14, 17, 19, 21-22, above and further in view of U. S. Patent No. 6,187,688 (Ohkuni et al., hereinafter referred to as Ohkuni).

Cho in view of Lou is discussed in paragraph no. 4.

The difference between the claims and Cho in view of Lou is that Cho in view of Lou does not disclose increasing the flow rate of the SO_2 gas to a flow rate of the oxygen gas during etching (claims 7, and 15). Cho in view of Lou does not disclose that the flow rate of SO_2 gas is increased when the time necessary for etching a whole thickness of the antireflection film elapses (claims 8, and 16).

Ohkuni, in col 10, lines 50-53, in col 11, lines 1-29, discloses that the flow rate of the SO_2 gas is maintained higher than the flow rate of the oxygen during the dry etch process of the antireflecting film.

Therefore, it would be obvious to a skilled artisan to modify Cho in view of Lou by employing the flow rate of the SO_2 gas as suggested by Ohkuni because Ohkuni, in col 13, lines 63-67, discloses that increasing the flow rate of the SO_2 gas results in a positive size variation in the sidewalls of the antireflection pattern.

6. Claims 23-26, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,579,808 (Cho et al., hereinafter referred to as Cho) in view of U. S. Patent No. 6,110,826 (Lou et al., hereinafter referred to as Lou) as applied to claims 1-2, 4-6, 9-12, 14, 17, 19, 21-22, above and further in view of U. S. Patent Application Publication No. 2003/0134231 (Tsai et al., hereinafter referred to as Tsai).

Cho in view of Lou is discussed in paragraph no. 4.

The difference between the claims and Cho in view of Lou is that Cho in view of Lou does not disclose that the etching of the resist pattern reduces the width of the resist pattern (claims 23-26).

Tsai, in [0007], discloses that SO_2/O_2 mixture gas is used to reduce the resist pattern width (reduction in critical dimension, i.e., reduction in pattern width).

Therefore, it would be obvious to a skilled artisan to modify Cho in view of Lou by performing the etch process suggested by Tsai to reduce the pattern width because Tsai, in [0007], discloses that performing the etch process on the resist pattern increase the etching process anisotropy and reduces microloading effects.

Response to Arguments

7. Applicant's arguments with respect to claims 1-2, 14-17,19, 21-26, filed November 8, 2006, have been considered but are moot in view of the new ground(s) of rejection. The 102 (e) rejection made in the previous office action (paper no. 20060807) over claims 1-2, 4-6, 9-12, 14, and 17-22, has been withdrawn.

A) Applicants argue that Cho does not teach the use of oxygen for any described embodiment and that there is no teaching of utilizing oxygen in the first etch gas of SO_2 and He.

See paragraph no. 4. Cho is not depended upon to disclose the use of oxygen as the etch gas. Lou is depended upon to teach the utilization of O_2 gases in the mixture of etch gases so as to perform an etching process.

B) Applicants argue that there is no technical basis to combine the flow rate of Ohkuni and the gas mixture of Cho, and that a skilled artisan would not have a reasonable expectation of success in applying the flow rate of Ohkuni to the gas mixture of Cho.

Neither Ohkuni nor Cho is depended upon to disclose the flow rate of the first gas. Lou is depended upon to disclose the claimed flow rate of the first gas (He). See paragraph no. 4.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daborah Chacko-Davis

January 18, 2007.

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700